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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/629,228	07/28/2003	Lewis B. Aronson	15436.247.2.1.5	5307
22913	7590	05/24/2007	EXAMINER	
WORKMAN NYDEGGER (F/K/A WORKMAN NYDEGGER & SEELEY) 60 EAST SOUTH TEMPLE 1000 EAGLE GATE TOWER SALT LAKE CITY, UT 84111			MALKOWSKI, KENNETH J	
		ART UNIT	PAPER NUMBER	
		2613		
		MAIL DATE	DELIVERY MODE	
		05/24/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	Application No.	Applicant(s)
	10/629,228	ARONSON ET AL.
	Examiner Kenneth J. Malkowski	Art Unit 2613

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 13 March 2007.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) \_\_\_\_\_ is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-6,8-24 and 27-33 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 28 July 2003 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>3/7/07</u> .  | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Drawings*

1. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the “receive path comprising a receiver eye opener having an adaptive equalizer located in the receiver path and a clock and data recovery circuit coupled to transmit a recovered clock signal to the adaptive equalizer wherein the CDR unit *is located external to the receive path (emphasis added)*” as claimed in claims 1,16 and 20 must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1,16 and 20 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim contains subject matter, which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Specifically, a receive path comprising a receiver eye opener having an adaptive equalizer located in the receiver path and a clock and data recovery circuit coupled to transmit a recovered clock signal to the adaptive equalizer wherein the CDR unit *is located external to the receive path* is not described in the specification or shown in the drawings. Furthermore, it is unclear how, if the CDR is contained within the “receiver eye opener” and if the “receive path” comprises the “receiver eye opener” as claimed, the CDR unit is located external to the receive path. The only instance showing the CDR, equalizer and the receive path is in Figure 21a. However, it is clear from the drawing that the CDR is **not** external to the receive path. Rather, the receive path is split into three portions and received by elements 2110, 2120, and 2130. For the purposes of examination, the above mentioned limitation will not be examined on the merits in claims 1, 16 and 20 until the enablement requirement has been satisfied.

Furthermore, claim 33 is also rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. Claim 33 claims a “transceiver module wherein the adaptive equalizer is configured to adapt to changing temperature conditions.” However, the

portion cited by applicant as support for the newly entered claim on page 29 paragraph 93 only describes "an adaptive equalizer that adapts to channel conditions such as changing temperature." If such a limitation is well known in the art to one of ordinary skill in the art, then such a limitation would clearly not be patentable. If such a limitation is not well known in the art then by merely restating the claim limitations within the specification does not allow one of ordinary skill in the art the ability to make and/or use the invention.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-8, 15-17 and 20-27 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,075,634 to Casper et al in view of U.S. Patent Application Publication No. 2003/0011847 to Dai et al. and further in view of U.S. Patent Application Publication No. 2003/0053170 to Levinson et al.

With respect to claims 1, 15 –16 and 20-21 Casper discloses an optical transceiver module (column 1 lines 55-58 (fiber optic transponder containing a transceiver unit)), having a serial (column 1 lines 16-22 (serialized digital data))(column 2 lines 4-9 (highly precise serial data signal)) electrical interface with an electrical output port and an electrical input port, for receiving and transmitting signals, the transceiver module comprising (column 1 lines 55-58 (opto-electric converter-receiver; electro-optic converter transmitter)):

a receive path comprising: an optical input port for receiving a first optical signal from external to the transceiver module (12, Fig 1)(column 1 lines 55-58 (opto-electronic converter receiver coupled from an incoming optical fiber (16, Fig 1))).

a receiver eye opener for retiming and reshaping a first serial (column 1 lines 16-22 (serialized digital data))(column 2 lines 4-9 (highly precise serial data signal)) electrical data stream based on the first optical signal (column 2 lines 3-12 (output of opto-electric receiver is reshaped and retimed))(column 5 lines 5-10 (regenerated signal has optimally open eye pattern))(column 4 lines 52-67 (CDR is used in both transmit and receive paths wherein the CDR retimes and removes amplitude noise))

and an electrical output port of the serial electrical interface for transmitting the retimed and reshaped first serial (column 1 lines 16-22 (serialized digital data))(column 2 lines 4-9 (highly precise serial data signal)) electrical data stream to the transceiver module (30, Fig 1)(30, Fig 2 (shows electrical data “from CDR (36)” input to electrical output port (40) for external purposes from DFB laser (60)) ;

and a transmit path comprising: an electrical input port of the serial electrical interface for receiving a second serial (serialized digital data))(column 2 lines 4-9 (highly precise serial data signal)) electrical data stream from the transceiver module (Fig 3)(90 Fig 1 (fiber optic receiver))(column 5 lines 49-64 (converter receiver converts incoming optical data signals from optical fiber (102) into electrical signals)).

a transmitter eye opener for retiming and reshaping the second serial (serialized digital data))(column 2 lines 4-9 (highly precise serial data signal)) electrical data stream based on the

first optical signal column 5 lines 1-10 (regenerated signal has optimally open eye pattern))(column 4 lines 52-67 (CDR is used in both transmit and receive paths wherein the CDR retimes and removes amplitude noise))

and an optical output port for transmitting a second optical signal to external to the transceiver module, the second optical signal based on the retimed and reshaped second serial (serialized digital data))(column 2 lines 4-9 (highly precise serial data signal)) electrical data stream (13 Fig 1)(column 4 lines 20-29). However, Casper fails to disclose the receiver eye opener having an adaptive equalizer located in the receive path or transmit path. Dai, from the same field of endeavor discloses a method and apparatus for adaptive distortion compensation in optical fiber communication networks (title). Dai teaches an adaptive transceiver (page 3 paragraph 30) containing adaptive receivers and transmitters (page 2 paragraph 24) used in high speed data transmission of 10 Gb/s or higher (page 2 paragraph 21) including a receiver eye opener (CDR) having an adaptive equalizer embedded in CDR circuitry (page 2 paragraph 26 (decision feedback equalizer embedded in clock and data recovery circuitry (hereinafter CDR)))(page 3 paragraph 31 (adaptive equalizer, eye opening measurement circuit)). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the method and apparatus of implementing adaptive electronic equalizer in eye opener circuitry as taught by Dai in the eye-opening receiver/transmitter circuitry taught by Casper. The motivation for doing so would have been to provide integrated apparatus and methods for adaptively compensating for dispersion impairment due to polarization mode dispersion, chromatic dispersion and the like, thereby enabling high-speed optical data transfer with minimal transmission errors (Dai: page 2 paragraph 22). Furthermore it is advantageous to implement said

electronic equalizer into said CDR because of ease of integration as well as a relatively low incremental cost (Dai: page 3 paragraph 36)).

Furthermore, Although Casper in view of Dai do disclose a serial interface with a serial electrical input port (serial electrical data enters long distance CDR 140 shown in Figure 4) (“serial data out to CDR 140”, Figure 3) and an electrical output port (serial electrical data exits Gigabit Ethernet CDR 21 shown in Figure 4) (“serial data in from CDR 21”, Figure 3), Casper in view of Dai fail to specifically disclose that the serial data stream to and from external to the transceiver module is electrical as is claimed in claim 1. Rather, Casper in view of Dai disclose the serial data stream to and from external to the transceiver module is optical. However, transmitting serial electrical data externally from a transceiver module and receiving external serial electrical data is notoriously well known in the art and is commonly used. Levinson, from the same field of endeavor discloses an optoelectronic transceiver (page 1 paragraph 2) which has an electrical serial interface including an electrical output port for transmitting serial electrical data to external to the transceiver module (“data to host device” noted as “serial data” shown in Figure 2A) and an electrical input port for receiving a second electrical data stream from external to the transceiver module (“data from host device” noted as “serial data” shown in Figure 2A)(702, electrical interface, Figure 7A)(page 6 paragraph 64 (electrical interface 702 couples a host device to the transceiver)). Therefore, it would have been obvious to one of ordinary skill in the art to electrically interface the transceiver as taught by Casper in view of Dai such that signals external to the transceiver are in electrical form as is taught by Levinson. The motivation for doing so would have been to be able to implement the advantages of the transceiver as taught by Casper in view of Dai in a host device. The method as

taught by Levinson also satisfies a need for a highly flexible interface between an optoelectronic device and a host device (Levinson: page 1 paragraph 7).

With respect to claims 2 and 22, Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 1 wherein the adaptive equalizer comprises a decision feedback equalizer (Dai: page 2 paragraph 26 (decision feedback equalizer embedded in CDR decision circuitry)).

With respect to claims 3 and 23, Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 1 wherein the adaptive equalizer comprises a feed forward filter (Dai: Fig 2)(Dai: page 4 paragraph 52 (feed forward equalizer)).

With respect to claims 4, 17 and 24 Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 1 wherein the receiver eye opener further comprises a clock and data recovery (CDR) unit for recovering a clock signal from the first serial electrical data stream (Casper: column 2 lines 3-20 (low-jitter clock is derived for retiming data and removing amplitude noise))(Casper: column 4 lines 46-60 (column 4 lines 52-67 (CDR is used in both transmit and receive paths wherein the CDR retimes and removes amplitude noise))(Casper: 140, 21 Fig 1).

With respect to claims 5, 6 and 25 Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 4 wherein the CDR recovers the clock signal from the first serial electrical data stream before retiming and reshaping (Fig 4)(Casper: column 2 lines 3-20 (wherein low-jitter clock derived from serial data is used *for* retiming Gigabit Ethernet data and removing amplitude noise)). Specifically with respect to claim 6, Casper in view of Dai do

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not specifically show reversing the order of the retiming and reshaping with respect to the position of the CDR, however, doing so would merely reflect a designer's design choice because regardless of the said order, equivalent results occur with both orders in that the clock will be recovered and the serial electrical data stream will be retimed and reshaped.

With respect to claims 8 and 27, Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 1 further comprising: a coefficient module coupled to receive the first serial electrical data stream (Dai: page 1 paragraph 9 (data in regeneration section is electrical)) and to transmit coefficients to the adaptive equalizer (Dai: page 5 paragraph 58 (decision feedback equalizer (DFE), original signal and output of each tap is multiplied by coefficients  $c(0)-c(k)$ ))(Dai: Fig 3)(Dai: page 4 paragraph 53 (gain controlled by coefficients))(Dai: page 3 paragraph 34 error detection circuit measures data eye opening in time and amplitude domains...for compensation and other purposes).

5. Claims 9-11, 18-19 and 28-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,075,634 to Casper et al in view of U.S. Patent Application Publication No. 2003/0011847 to Dai et al. and further in view of U.S. Patent Application Publication No. 2003/0053170 to Levinson et al. and further in view of U.S. Patent No. 6,469,782 to Schaepperle

With respect to claims 9, 19 and 28 Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 8, however, coefficients are based on convolution rather than autocorrelation functions (page 4 paragraph 53)(72, Fig 3 shows convolution formula). Although convolution is similar to autocorrelation, Casper in view of Dai does not use specifically use autocorrelation. Schaepperle, from the same field of endeavor, discloses an electrical adaptive equalizer (column 1 lines 34-38 (rapid, adaptive electronic

equalization of optical signals) used to aide in opening an eye diagram for the purpose of improving transmission characteristics (column 1 lines 38-42). Schaepperle teaches said equalizer using calculated coefficients wherein the coefficients are based on autocorrelation functions of the first serial electrical data stream (column 2 lines 42-60 (autocorrelation function, parameters are used to calculate coefficients of an adaptive transversal filter for equalizing PMID-distorted signal)(Figures 2-4)(Fig 3 shows an optical receiver that converts optical data to electrical data (11, Fig 3) prior to equalization)). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the method and apparatus used to create coefficients based on autocorrelation functions as taught Schaepperle rather than convolution within the adaptive equalizer as taught by Casper in view of Dai and further in view of Levinson. The motivation for doing so would have been to very rapidly detect the two parameters of the polarization mode dispersion, even in the event of strong signal distortion (Schaepperle: page 1 lines 35-42).

With respect to claims 10-11, 18 and 29-30 Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 8 further comprising: at least two analog correlation modules (Fig 3)(page 5 paragraph 58 (adaptive gain controls can be performed in analog or digital domain)), each for calculating a function of the first serial electrical data stream, wherein the coefficients are based on the calculated functions (Fig 3 shows calculated coefficients  $c(0)-c(k)$ ). However, Casper in view of Dai and further in view of Levinson fails to disclose basing the coefficients on autocorrelation functions. Schaepperle, from the same field of endeavor, discloses an electrical adaptive equalizer (column 1 lines 34-38 (rapid, adaptive electronic equalization of optical signals) used to aide in opening an eye diagram for the purpose

of improving transmission characteristics (column 1 lines 38-42). Schaepperle teaches said equalizer using calculated coefficients wherein the coefficients are based on autocorrelation functions of the first serial electrical data stream (column 2 lines 42-60 (autocorrelation function, parameters are used to calculate coefficients of an adaptive transversal filter for equalizing PMD-distorted signal)(Figures 2-4)(Fig 3 shows an optical receiver that converts optical data to electrical data (11, Fig 3) prior to equalization)). It would have been obvious to one of ordinary skill in the art at the time of the invention to use the method and apparatus used to create coefficients based on autocorrelation functions as taught Schaepperle rather than convolution within the adaptive equalizer as taught by Casper in view of Dai and further in view of Levinson. The motivation for doing so would have been to very rapidly detect the two parameters of the polarization mode dispersion, even in the event of strong signal distortion (Schaepperle: page 1 lines 35-42).

6. Claims 12-14 and 31-32 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,075,634 to Casper et al. in view of U.S. Patent Application Publication No. 2003/0011847 to Dai et al. and further in view of U.S. Patent Application Publication No. 2003/0053170 to Levinson et al. and further in view of U.S. Patent Application Publication No. 2002/0060824 to Liou et al.

With respect to claims 12-14 and 31-32, Casper in view of Dai and further in view of Levinson discloses the transceiver module of claim 1 wherein serialized digital data can achieve relatively high data rates (column 1 lines 16-30 (serialized digital data, 1Gb/s or higher)(column 2 lines 4-9 (highly precise serial data signal)), however Casper fails to specifically disclose said serial electrical data stream achieving a data rate of 10 Gb/s or faster. Liou, from the same field

of endeavor discloses a transceiver module that is substantially similar to the module as disclosed by Liou. Liou teaches said module wherein the first serial electrical data stream had a data rate of 10 Gb/s or faster (page 3 paragraph 24)(page 1 paragraph 6). At the time of invention it would have been obvious to one skilled in the art to replace the DFB laser used in the transmission system as taught by Casper with the electro-absorption modulated FP laser as taught by Liou. The motivation for doing so would have been to achieve a data stream rate of 10 Gb/s and to achieve a superior transmission characteristic exemplified by the eye diagram model (Liou: Page 1 paragraph 6)(Liou: page 3 paragraph 24). Within a system that achieves a serial data stream rate of 10 Gb/s said transceiver module inherently comprises a 10-Gigabit compliant transceiver module and a 10 Gb/s serial electrical interface.

7. Claim 33 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6,075,634 to Casper et al. in view of U.S. Patent Application Publication No. 2003/0011847 to Dai et al. and further in view of U.S. Patent Application Publication No. 2003/0053170 to Levinson et al. and further in view of U.S. Patent No. 5,978,417 to Baker et al.

With respect to claim 33, Casper in view of Dai and further in view of Levinson disclose the transceiver module of claim 1, however fail to disclose the adaptive equalizer is configured to adapt to changing temperatures. Despite this, adaptive equalizers that are configured to compensate for temperature variations are well known in the art. Baker, from the same field of endeavor discloses an adaptive equalizer (title), which compensates for temperature variations (abstract)(column 1 lines 40-45). Therefore, it would have been obvious to one of ordinary skill in the art at the time of invention to implement the temperature compensation as taught by Baker into the adaptive equalizer as taught by Casper in view of Dai and further in view of Levinson.

The obvious motivation in this case would have been to maintain the required balance in output fluctuations and jitter due to temperature variations (Baker: column 1 lines 39-44).

*Response to Arguments*

8. Applicant's arguments with respect to claims 1-33 have been considered but are moot in view of the new ground(s) of rejection.

*Conclusion*

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kenneth J. Malkowski whose telephone number is (571) 272-5505. The examiner can normally be reached on M-F 8:30-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KJM 5/14/07



**KENNETH VANDERPUYE**  
**SUPERVISORY PATENT EXAMINER**